

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
7 August 2003 (07.08.2003)

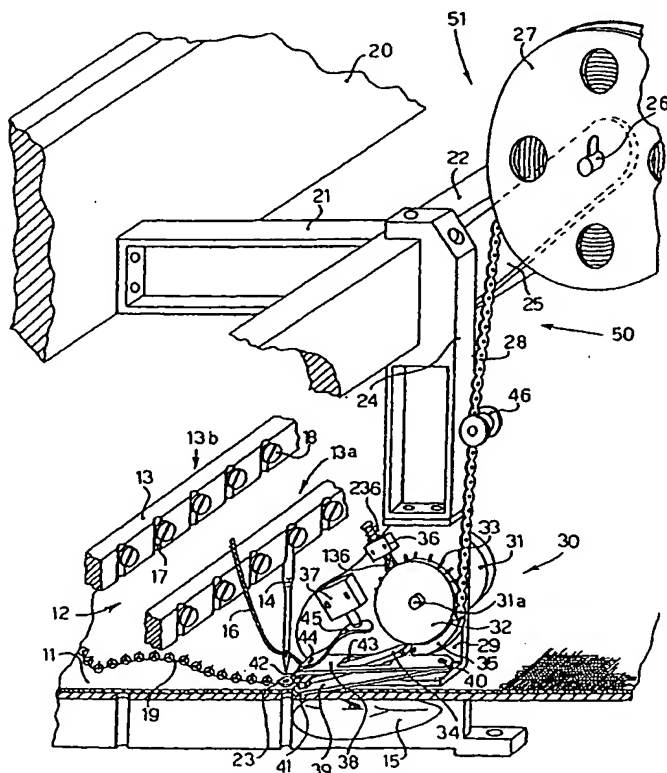
PCT

(10) International Publication Number  
**WO 03/064749 A1**

- (51) International Patent Classification<sup>7</sup>: D05C 7/08, (74) Agent: PETRAZ, Gilberto; GLP Srl, Piazzale Cavedalis, 6/2, I-33100 Udine (IT).  
D05B 11/00
- (21) International Application Number: PCT/IB03/00236 (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 28 January 2003 (28.01.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: UD2002A000018 29 January 2002 (29.01.2002) IT
- (71) Applicant and  
(72) Inventor: LANDONI, Giannino [IT/TT]; Strada Provinciale Busto/Cassano, 1, I-21054 Fagnano Olona (IT).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: DEVICE AND METHOD TO APPLY PAILLETTES ON FABRICS IN A SEWING MACHINE, AND MULTI-NEEDLE SEWING MACHINE COMPRISING SAID DEVICE



(57) Abstract: Device (50) and method to apply paillettes (23), strass or similar in a sewing machine (10) suitable to make stitches (19) on continuously fed textile material (11). The sewing machine (10) has upper sewing members (12) consisting of a needle-bearing bar (13a) movable with alternating motion and able to support a plurality of needles (14), and lower sewing members (15). The method provides to feed a strip (28) of paillettes (23) through the device (50) arranged in correspondence with at least one of the needles (14), to drive step-wise at least a drawing element (32) of the strip (28), in a manner mating with the descending movement of the needle (14), in order to position a paillette (23) below the needle (14) in the sewing position, and to drive a cutting assembly (40, 41) to cut the paillette (23) from the strip (28), when the tip of the needle (14) acts on the paillette (23), thus causing the latter to be sewn onto the textile material (11).

WO 03/064749 A1

WO 03/064749 A1



**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

"DEVICE AND METHOD TO APPLY PAILLETES ON FABRICS IN A SEWING MACHINE, AND MULTI-NEEDLE SEWING MACHINE COMPRISING SAID DEVICE"

\* \* \* \* \*

5 FIELD OF THE INVENTION

The present invention concerns a device to apply paillettes or strass on simple or padded fabrics. The invention also concerns the method to apply paillettes or strass on fabrics, and the machine which adopts said device and method.

The invention is applied in the textile field and refers to the automatic application, when stitches are made which achieve a desired design or ornamental pattern, of paillettes or strass of any type, shape, size and pitch, on simple, multi-layer or padded fabrics, fed continuously from rolls.

The invention is preferentially, though not exclusively, applied on multi-needle quilting machines, both of the type which make knotted point and chain point stitches.

20 The present invention is characterized in that it has at least one support element on which are mounted, at regular intervals, a plurality of devices to feed and cut the paillettes, each of which devices is substantially arranged opposite a relative needle of the sewing machine.

25 These devices to feed and cut the paillettes are able to present, under each needle, in the points of the ornamental pattern wherein they are required to be applied, a paillette of any type, shape, size and pitch; the paillette is attached to the fabric with suitable sewing stitches, in a line or star or at three points at 120°, and then the devices are able to cut it from the strip on which it is fed.

BACKGROUND OF THE INVENTION

In the field of embroidering machines, both the Shiffli

type and the multi-head type, the state of the art includes the use of devices to automatically apply paillettes or strass on single pieces or on fabrics.

Such devices work on individual garments or on pieces of  
5 fabric of a limited length, drummed on suitable frames with a discontinuous working pattern and limited productivity.

The ornamental patterns made by such devices are isolated, very distant from each other and discontinuous; the maximum speed at which they are made is in the order of 150/200  
10 stitches a minute.

Conventional devices of this type, as are used at present, are therefore not suitable to be used on machines which continuously work fabrics fed from rolls, with speeds which can reach 600-700 stitches a minute.

15 US-A-4,848,253 shows an example of such known machines; in fact it discloses an embroidery machine equipped with plural sets of needles and comprising a device for cutting off spangles from a suitable strip of blanks and sewing the same on fabrics. However, this machine is able to work only on  
20 segments of fabrics drummed onto working tables or frames movable in at least two directions to make the requested stitches and not on fabrics fed continuously from rolls mounted on movable carriages.

The present Applicant has devised and embodied this  
25 invention to overcome this shortcoming of the state of the art, and to obtain further advantages as will be explained hereafter.

#### SUMMARY OF THE INVENTION

The present invention is set forth and characterized in  
30 the respective main claims, while the dependent claims describe other characteristics of the main embodiment.

The purpose of the invention is to provide a device, and the relative method, to apply on fabrics paillettes or

strass of any type, shape, size or pitch, suitable to be applied on a sewing machine, particularly on a multi-needle sewing machine, with the purpose of working fabrics fed continuously with speeds in the range of 600-700 stitches a minute.

A further purpose is to achieve a sewing machine with the device mentioned above, suitable to work continuously simple and padded fabrics, obtaining any ornamental pattern consisting of stitches and appliqué works of paillettes, strass or similar, by means of an electronic control.

The following description will describe only paillettes, but every time this will refer also to strass or other similar ornamental element.

A sewing machine on which the device according to the invention is applied comprises at least a needle-bearing bar, on which a plurality of needles are mounted aligned and at suitable intervals. The needle-bearing bar is equipped with alternating ascending-descending movements to take every needle to cooperate with a mating lower sewing element, consisting of a shuttle, a rotary crochet or a mobile hook, also equipped with alternating movement mating with the movement of the needle-bearing bar.

The cooperation between the needles, each of which is fed with its own thread called the needle thread, and the lower sewing elements, each one also fed with its own thread, determines the sewing of stitches on the fabrics, fed continuously from rolls and interposed between said sewing members.

The sewing machine according to the invention also comprises at least a fixed cross-piece which supports the command members of the needle-bearing bars. According to the invention, on the cross-piece there is a bar which supports, in correspondence with specific, selected needles, a mating

plurality of devices able to make an application of paillettes on the fabric according to a desired ornamental pattern, managed by the command computer of the sewing machine.

- 5 Each of said devices consists at least of an assembly to feed the paillettes and an assembly to advance and cut the paillettes.

The assembly to advance and cut the paillettes comprises an element to draw the strip feeding the paillettes  
10 consisting, in a preferential embodiment, of a wheel comprising on the outside means to advance the strip, for example spikes or similar.

In a preferential embodiment of the invention, next to the drawing wheel there is a pressure element, and below the  
15 wheel there is a guide element.

In a preferential embodiment the pressure element is of the oscillating lever type.

The pressure element has a seating in which the drawing wheel can slide, and can alternately assume two positions, a  
20 working position when one free end is thrust upwards and its sliding seating adheres to the outer circumference of the wheel, and a position of non-interference wherein it detaches from the wheel and allows to change, or insert, the strip which feeds the paillettes.

25 The guide element has one end contiguous to the lower part of the pressure element and the other end very near the corresponding needle and a few millimeters above the fabric being worked.

In cooperation with the periphery of the drawing wheel  
30 there is also a positioning assembly mounted, comprising at least a pressure element associated with elastic means to selectively act in cooperation with said wheel and to determine a controlled step-wise unwinding of the strip of

paillettes.

According to the invention, under the drawing wheel there is also a cutting assembly which can be selectively activated to cut the paillettes with respect to the feed  
5 strip.

In a preferential embodiment, the cutting assembly consists of a shears comprising a pair of blades which can be selectively activated.

The assembly to feed the paillettes comprises at least a  
10 feed strip associated with unwinding means.

In order to apply a paillette on a fabric, the feed strip is unwound and is engaged by the advance means of the drawing wheel, which draw the strip with advance impulses controlled by the positioning assembly. The strip slides on  
15 the guide element and passes inside the cutting assembly, arriving in proximity with the corresponding needle.

By means of impulses transmitted by the command computer of the sewing machine, at the moment when a paillette is required to be applied at a particular point of an  
20 ornamental pattern, the speed of descent of the needles is temporarily reduced and the positioning assembly is driven to make the feed strip advance by a pre-established value, corresponding to the diameter of the paillettes being used.

As a consequence, the first paillette on the strip is  
25 presented with its hole exactly under the corresponding needle which, as it descends, enters into said hole.

At this point, the cutting assembly is driven, causing the paillette to be cut, which is attached by the needle on the fabric according to the orders given by the computer.

30 When the application is ended, the needle begins its normal sewing again, following the ornamental pattern.

According to the invention, the application of the paillettes can be programmed independently needle by needle,

thus considerably extending the possibilities of making very particular ornamental patterns which would be impossible on conventional machines.

5 With this invention it is therefore possible to apply paillettes, on a fabric fed continuously, according to the ornamental pattern made by the machine, at a much higher speed and with much thicker and continuous designs than those which can be obtained on any other conventional machine, with obvious advantages in terms of productivity  
10 and variety of application.

The sewing machine which has the device according to the invention can be used as a normal sewing machine, for example a multi-needle quilting machine, excluding the function of said device; or as an embroidery machine to  
15 apply paillettes on simple or padded fabrics fed continuously; or again as a machine which simultaneously makes both quilting and the application of paillettes or similar, thus obtaining mixed ornamental patterns with innovative and previously unseen characteristics.

#### 20 BRIEF DESCRIPTION OF THE DRAWINGS

These and other characteristics of the present invention will be apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

25 Fig. 1 is a schematic view of an electronically commanded multi-needle quilting machine of the type able to comprise a device to apply paillettes according to the invention;

Fig. 2 is a schematic lateral prospective view of the device  
30 to apply paillettes according to the invention;

Figs. 3a-3d show some examples of ornamental patterns which can be obtained with the machine according to the invention.



## DETAILED DESCRIPTION OF A PREFERENTIAL EMBODIMENT

Fig. 1 shows an electronically commanded multi-needle quilting machine 10 the general type of which is in itself substantially conventional. The quilting machine 10  
5 comprises, as essential parts, an inlet assembly 10a, a sewing assembly 10b and an outlet assembly 10c.

The inlet assembly 10a is used to feed the textile material 11 which is to be worked. The inlet assembly 10a is managed and controlled by a command software and is  
10 therefore able to move the textile material 11 fed in any direction whatsoever, backwards-forwards or left-right, in order to make any pattern, even the most complex.

The sewing assembly 10b comprises upper sewing members 12 and lower sewing members 15 of a conventional type.

15 The upper sewing members 12 consist, in this case, of two needle-bearing bars 13, respectively 13a and 13b, parallel to each other and on which respective needles 14 are mounted, aligned with each other, each one cooperating with a respective thread 16, called the needle thread, fed from  
20 respective cones 116 arranged in the upper part of the machine 10 or in front of it.

The needle-bearing bars 13 have seatings 17 to position the needles associated with means 18 to clamp the needles 14 in position. In this case, that is, for the application of  
25 paillettes, only the front needle-bearing bar 13a is used, whereas the rear needle-bearing bar 13b is used for normal quilting.

Fig. 2, for a better understanding of the invention, shows only one needle 14, it being obvious that according to the  
30 type of sewing to be done all the seatings 17 can house a relative needle 14.

The needle-bearing bars 13a and 13b are equipped with alternating ascending-descending movement, to take the

relative needles 14 to cooperate with the respective lower sewing members 15, consisting in conventional fashion of shuttles, rotary crochets or alternately mobile hooks.

The cooperation between the sewing members 14 and 15  
5 determines the simultaneous formation on the textile material 11 of a plurality of stitches 19 which, according to the movement imparted to the textile material 11, make desired ornamental patterns to obtain a quilted or embroidered article which is collected by the outlet  
10 assembly 10c.

According to known constructive practices, the multi-needle sewing machine 10 is equipped with a cross-piece 20 which supports the command members of the needle-bearing bars 13. In this case, a transverse bar 22 is attached to  
15 said cross-piece 20 by means of supporting elements 21; a plurality of devices 50 for the automatic application of paillettes 23 on the textile material 11 are mounted on the transverse bar 22 at regular intervals corresponding to the selected needles 14.

20 Each of the devices 50 comprises an assembly 51 to feed the paillettes 23 and an assembly 30 to advance and cut the paillettes 23.

The feed assembly 51 comprises a substantially vertical support 24 at the upper part of which an arm 25 is attached,  
25 bearing a transverse pin 26 on which a bobbin 27 rotates which feeds the strip 28 of the paillettes.

The assembly 30 to advance and cut the paillettes 23 is attached to the lower part of said vertical support 24, and consists of a vertical support plate 29 arranged  
30 substantially perpendicular to the needle-bearing bar 13a.

On the support plate 29 are attached a rotary pneumatic actuator 31, a linear pneumatic cylinder 37 and a spring-type positioner 36, the shaft 31a of the rotary pneumatic

actuator 31 being substantially parallel to the needle-bearing bar 13a and passing through a suitable hole made in the support plate 29.

5 A drawing wheel 32 is mounted on the shaft 31a, on the side opposite the rotary actuator 31 with respect to the support plate 29; on its outer circumference the drawing wheel 32 has a series of equidistant spikes 33, the diameter and pitch of which correspond to the diameter of the hole and the pitch of the paillettes 23 being used, in their feed  
10 strip 28.

Behind the drawing wheel 32 there is an oscillating semi-circular pressure element 35, which has a concave semi-circular surface with a radius mating with, advantageously equal to, that of the wheel 32. Under the drawing wheel 32  
15 there is also a conveyor guide 34 shaped like a flattened tube with an inner width substantially corresponding to the width of the strip 28 feeding the paillettes 23; the feed strip 28 slides inside the guide 34.

The semi-circular pressure element 35 has its lower end  
20 pivoted to said support plate 29 and, in its concave semi-circular surface, has a groove inside which the spikes 33 of said wheel 32 slide.

The semi-circular pressure element 35 can also assume two positions: a working position, when its free end is thrust  
25 upwards and its concave surface adheres to the outer circumference of said wheel 32, keeping the strip 28 also adherent thereto; and a position to change, or insert, the feed strip 28 when the free end of the pressure element 35 is thrust downwards and its concave surface is detached from  
30 the outer circumference of the wheel 32, uncovering the spikes 33 and hence allowing to remove or insert the strip 28 engaged thereon.

The conveyor guide 34 is attached to the support plate 29

in such a manner that one end thereof is contiguous with the lower end, pivoted, of the pressure element 35 and the other end is very near the corresponding needle 14 and a few millimeters above the textile material 11.

5 Above the wheel 32 there is mounted a spring-type positioner 36, which is attached to the support plate 29 and has a roller 136 charged by a spring 236. The roller 136 rests, with a slight pressure supplied by the spring 236, on the outer circumference of the wheel 32, inserting itself  
10 exactly between two adjacent spikes 33 so as to stop said wheel 32 step-wise, inserting itself with every step between spike and spike.

Under the wheel 32 there is also a little cutter, consisting of two steel platelets 38 and 39 arranged one  
15 above the other and substantially parallel to the support plate 29.

The rear ends of the platelets 38 and 39, below the wheel 32, are attached to each other by a pin 40 so that the two platelets, being slightly open, are spread wide; their front  
20 ends, near the corresponding needle 14, are bent at an angle of 90° one towards the other and sharpened so as to form two blades 41 and 42.

The lower platelet 39 is attached to the lower part of the support plate 29, while there is an aperture 43 made in the  
25 upper platelet 38, through which said conveyor guide 34 passes, which has a width of less than that of the platelets 38 and 39. In this way, the conveyor guide 34, which in the rear part is higher than the upper platelet 38, passes through the aperture 43 so that its front end finds itself  
30 between the platelets 38, 39 and very near the blades 41 and 42.

In the front part of each of the platelets 38, 39 two corresponding holes are made, through which a vertical tie

bar 44 passes whose lower end is attached to said lower platelet 39 and on whose upper end an S-shaped lever 45 is hinged.

5 The rod of the tie bar 44 has a shape configured so as to allow said conveyor guide 34 to pass inside.

The hump of said S-shaped lever 45 which is lower and nearer the tie bar 44 presses on the upper part of said upper platelet 38, while the free end of the lever 45 rests on the end of the rod of the linear pneumatic cylinder 37.

10 In the inactive position, the rod of the linear pneumatic cylinder 37 is retracted, the free end of the lever 45 is at the top and the blades 41, 42 are open. When the linear pneumatic cylinder 37 is activated, its rod extends, thrusting the free end of the lever 45 downwards;  
15 consequently, its hump near the tie bar 44 presses on said upper platelet 38, compressing the blade 41 against the blade 42 of the lower platelet 39.

The device 50 as described heretofore, applied on a multi-needle sewing machine 10, functions as follows.

20 The strip 28 which feeds the paillettes unwinds from the bobbin 27 which rotates on the transverse pin 26 solid with the arm 25.

The strip 28 slides downwards, passes over an intermediate guide wheel 46, is attached by the spikes 33 of the wheel 32  
25 driven by the rotary pneumatic actuator 31. The spikes 33 slide in the groove made in the concave surface of the pressure element 35, which keeps the strip 28 adherent to the wheel 32, and draw the strip 28 with a step-wise movement controlled by the roller 136 of the positioner 36.

30 The strip 28 enters the rear part of the conveyor guide 34, slides inside and, passing between the blades 41 and 42, arrives in proximity with the corresponding needle 14.

By means of impulses sent by the command computer of the

sewing machine 10, at the moment when a paillette 23 is required to be applied while an ornamental pattern is being made, the speed of the needle 14 is reduced. When the needle 14 reaches its upper dead point, a suitable electro valve  
5 (not shown in the drawings) sends air to the rotary pneumatic actuator 31 which consequently makes the wheel 32 rotate by one step of an amplitude controlled by the roller 136 engaged between two contiguous spikes 33 of the wheel 32.

10 This step causes the strip 28 to advance by a pre-set value corresponding to the diameter of one of the paillettes being used and, consequently, the first paillette 23 of the strip 28 is presented with its hole exactly under the corresponding needle 14 which, during its descent, enters  
15 the hole of the paillette 23.

At this point a second electro valve (not shown in the drawings) sends air to the linear pneumatic cylinder 37, the rod of which, as it extends, presses the free end of the lever 45, causing the blades 41, 42 to come together and  
20 therefore cut the paillette 23. The paillette 23 is thus attached by the needle 14 onto the textile material 11, for example with three stitches at 120° or with other types of stitches, linear or superimposed according to the orders given by the computer, after which the needle 14 starts its  
25 normal sewing again, following the ornamental pattern.

Some examples of the possible types of applications of paillettes 23 on the textile material 11 are shown in Figs. 3a-3d.

To adapt the device 50 to paillettes 23 of a different  
30 type, shape, size and pitch, some of the components, such as the wheel 32, the roller 136 of the positioner 36, the conveyor guide 34, etc., can be replaced on each occasion.

Modifications and variants can be made to the present

invention, all of which shall come within the field and scope thereof as defined by the claims.

For example, the rotary pneumatic actuator 31 and the linear pneumatic cylinder 37 can be replaced by any other  
5 rotary or linear actuator which performs the same or analogous function, such as electric motors, rotary or linear electromagnetic actuators, rotary or linear hydraulic actuators, actuators which command eccentrics, etc. The  
10 cutter can also be replaced by any other cutting member such as scissors, nailcutters, blades, punches, ultrasound or laser cutting, etc.

## CLAIMS

- 1 - Method to apply paillettes (23), strass or similar in a sewing machine (10) suitable to make stitches (19) on textile material (11) continuously fed from rolls mounted on a carriage movable in any direction backwards-forwards or left-right, said sewing machine (10) having upper sewing members (12) consisting of at least a needle-bearing bar (13a) movable with alternating motion and supporting a plurality of needles (14), and lower sewing members (15), characterized in that it provides to feed a strip (28) of paillettes (23) through a device (50) arranged in correspondence with at least one of said needles (14), to drive step-wise at least a drawing element (32) of said strip (28), in a manner mating with the descending movement of said needle (14), in order to position a paillette (23) below said needle (14) in the sewing position, and to drive a cutting assembly (40, 41) to cut the paillette (23) from the strip (28), when the tip of said needle (14) acts on said paillette (23), thus causing the paillette (23) to be sewn onto the textile material (11) continuously advancing, wherein the speed of descent of said needle (14) towards the textile material (11) is slowed down in a manner coordinated with the movement of advance of said strip (28) feeding said paillettes (23).
- 2 - Method as in claim 1, characterized in that the strip (28) feeding said paillettes (23) advances with a substantially constant pitch, substantially corresponding to the diameter of the paillette (23) in use.
- 3 - Device to apply paillettes (23), strass or similar on fabrics in a sewing machine (10) suitable to make stitches (19) on textile material (11) continuously fed from rolls mounted on a carriage movable in any direction backwards-forwards or left-right, said sewing machine (10) having



upper sewing members (12) consisting of at least a needle-bearing bar (13a) movable with alternating motion and supporting a plurality of needles (14), and lower sewing members (15), characterised in that it comprises at least a device (50) to apply one or more paillettes (23) on said textile material (11) continuously advancing, said device (50) being arranged in cooperation with at least one of said needles (14) and comprising at least a feed assembly (51) including a strip (28) to feed said paillettes (23) and an advance and cutting assembly (30) able to position one paillette (23) at a time in a sewing position associated with the position of said needle (14) and to cut it from said strip (28) in a manner functionally connected with its being sewn onto the textile material (11), said advance and cutting assembly (30) comprising at least a rotary actuator (31) driving a drawing means (32) able to draw said feed strip (28) to unwind it from the feed assembly (51).

4 - Device as in claim 3, characterised in that said drawing means comprises a wheel (32) with a plurality of spikes (33) on its outer surface, each one able to engage with a hole of a relative paillette (23).

5 - Device as in claim 3, characterised in that said feed assembly (51) comprises a bobbin (27) rotary on a support (26) and from which said feed strip (28) is able to unwind.

6 - Device as in claim 3, characterised in that said rotary actuator (31) is anchored on a support plate (29) and has its shaft (31a) passing through a hole made in said support plate (29), the wheel (32) being mounted on said shaft (31a).

7 - Device as in claim 3, characterised in that said rotary actuator (31) consists of a pneumatic actuator.

8 - Device as in claim 3, characterised in that said rotary actuator (31) consists of a step-wise electric motor.

9 - Device as in claim 3, characterised in that said rotary actuator (31) consists of a rotary electromagnetic actuator.

10 - Device as in claim 3, characterised in that said rotary actuator (31) consists of a rotary hydraulic actuator.

5 11 - Device as in claim 4, characterised in that in cooperation with the periphery of said wheel (32), there is a positioning assembly (36) able to condition the step-wise rotation of said wheel (32) during the unwinding of said feed strip (28).

10 12 - Device as in claim 11, characterised in that said positioning assembly (36) has at least a roller (136) associated with elastic thrust means (236) and able to be inserted between two adjacent spikes (33) of said wheel (32) to control the step-wise movement thereof.

15 13 - Device as in claim 4, characterised in that adjacent to said wheel (32) it comprises at least a pressure element (35) able to maintain said feed strip (28) adherent to the periphery of said wheel (32) and engaged on said spikes (33).

20 14 - Device as in claim 13, characterised in that said pressure element (35) is of the oscillating lever type and includes at least a working position cooperating with the periphery of said wheel (32) and an inactive position to allow the replacement, or insertion, of said feed strip (28).

25 15 - Device as in claim 13, characterised in that said pressure element (35) has a concave semicircular surface with a radius mating with the radius of said wheel (32), a groove being made in said concave surface wherein the spikes (33) of said wheel (32) slide.

30 16 - Device as in claim 4, characterised in that in cooperation with the lower part of said wheel (32) it comprises guide means (34) with a width mating with that of

the feed strip (28) in use.

17 - Device as in claim 16, characterised in that said guide means (34) have a first end contiguous with the fixed end of the pressure element (35) and the second end very near to the corresponding needle (14) and a few millimeters from the textile material (11) being worked.

18 - Device as in claim 4, characterised in that it comprises at least a cutting assembly (38, 39) arranged below said wheel (32) and in proximity with the textile material (11), said cutting assembly (38, 39) being able to cut the paillette (23) from the feed strip (28) in a manner functionally connected with its being sewn onto the textile material (11) by the needle (14).

19 - Device as in claim 18, characterised in that said cutting assembly comprises two platelets, respectively upper (38) and lower (39), having a first end reciprocally pivoted and the second end folded back and sharpened so as to define two respective opposite blades (41, 42).

20 - Device as in claims 16 and 19, characterised in that the upper platelet (38) has a hole (43) through which said guide means (34) pass in order to take said feed strip (28) to an intermediate position between said blades (41, 42).

21 - Device as in claim 19, characterised in that said blades (41, 42) are able to be selectively driven to cut the paillette (23) by means of a linear actuator (37) able to act on shaped lever means (45) which press on the upper surface of said upper platelet (38).

22 - Device as in claim 21, characterised in that said linear actuator (37) consists of a pneumatic or hydraulic actuator.

23 - Device as in claim 21, characterised in that said linear actuator (37) consists of an electromagnetic actuator.

24 - Device as in claim 21, characterised in that said linear actuator (37) consists of a rotary, pneumatic, hydraulic or electric actuator, commanding an eccentric.

25 - Device as in claim 18, characterised in that said  
5 cutting assembly comprises scissor means.

26 - Device as in claim 18, characterised in that said cutting assembly comprises a device of the nailcutter type.

27 - Device as in claim 18, characterised in that said  
10 cutting assembly comprises an ultrasound or laser cutting assembly.

28 - Device as in any claim from 3 to 27 inclusive, characterised in that at least some of its components, including the wheel (32), the roller (136) of the positioner (36) and the guide means (34), are replaceable so as to  
15 adapt to the type, shape, size and pitch of the paillettes (23) to be applied.

29 - Device as in any claim from 3 to 28 inclusive, characterized in that it comprises command means able to slow down the speed of descent of the needle (14) at the  
20 moment when a paillette (23) has to be applied on the textile material (11), and to start the unwinding of said feed strip (28) in order to take one of said paillettes (23) under the tip of said needle (14) in the stitching position.

30 - Multi-needle sewing machine to make stitches (19) on  
25 continuously fed textile material (11), said sewing machine comprising an inlet assembly (10a) to feed the textile material (11) to be sewn, a sewing assembly (10b) and an outlet assembly (10c) to collect the textile material (11) sewn, the sewing assembly (10b) comprising upper sewing  
30 members (12) consisting of at least a needle-bearing bar (13a) movable with alternating motion, and lower sewing members (15), said needle-bearing bar (13a) supporting needles (14) each one fed with its own thread (16),

characterized in that it also comprises a plurality of devices (50) to apply paillettes (23) on the continuously fed textile material (11), said devices (50) being mounted at intervals on a transverse bar (22) attached to a cross-piece (20) of said sewing machine (10), said devices (50) being arranged in correspondence with at least some of said needles (14), each of said devices (50) including a feed assembly (51) comprising a strip (28) to feed said paillettes (23) able to unwind from a relative bobbin (27), and an assembly (30) to advance and cut said strip (28) comprising at least drawing means (32) to draw said strip (28) associated with a relative actuator (31) and cutting means (41, 42) able to cut the paillette (23) to be applied on the textile material (11) from the relative strip (28), said bobbin (27) being mounted rotary on a pin (26) solid with an arm (25) anchored cantilevered on said transverse bar (22).

31 - Machine as in claim 30, characterised in that on said transverse bar (22) a substantially vertical support (24) is mounted, on the upper part of which said arm (25) is attached, and on the lower part of which said assembly (30) to advance and cut the strip (28) feeding the paillettes (23) is attached.

32 - Machine as in claim 31, characterised in that the advance and cutting assembly (30) comprises a substantially vertical support plate (29) arranged substantially orthogonal to said needle-bearing bar (13a), said plate (29) being able to support said drawing means (32) and, on the opposite side, the relative actuator (31), one end of a pressure element (35) cooperating with the periphery of said drawing means (32) to maintain the feed strip (28) adherent thereto, and a cutting assembly (38, 39) arranged below said drawing means (32) and able, when driven by a relative

linear actuator (37), to cut the paillette (23) to be sewn onto the textile material (11) from the feed strip (28).

33 - Machine as in claim 32, characterised in that it comprises a command computer able to drive the rotary  
5 actuator (31) to command the advance of the feed strip (28) and the linear actuator (37) to command the cutting of the paillette (23) every time the ornamental pattern being worked requires a paillette to be applied, to slow down the speed of the needles (14) and to present said paillette (23)  
10 exactly under said needles (14) while said needles (14) are descending towards the textile material (11) at reduced speed from their upper dead point.

34 - Machine as in any claim from 30 to 33 inclusive, characterised in that said devices (50) to apply paillettes  
15 can be de-activated to perform simple stitches on simple or padded textile material (11).

35 - Machine as in any claim from 30 to 34 inclusive, characterised in that it comprises needles (14) arranged on the relative needle-bearing bar (13a) only in the positions  
20 corresponding to the position of a respective device (50) to perform the application of the paillettes (23) onto the textile material (11).

36 - Machine as in any claim from 30 to 34 inclusive, characterised in that it comprises needles (14) arranged on  
25 the relative needle-bearing bar (13) both in the position where a relative device (50) is provided to apply the paillettes (23), and also in positions where said device (50) is not provided, in order to allow stitches (19) to be made combined or not with the application of paillettes  
30 (23).

37 - Machine as in claim 30, characterised in that it comprises an assembly to feed the textile material (11) with an electronic control, suitable to make said textile

material (11) make the desired movements, backwards-forwards or left-right, so as to obtain, as a function of the application of paillettes (23) stitched by the needles (14), the desired ornamental patterns of the stitches (19).

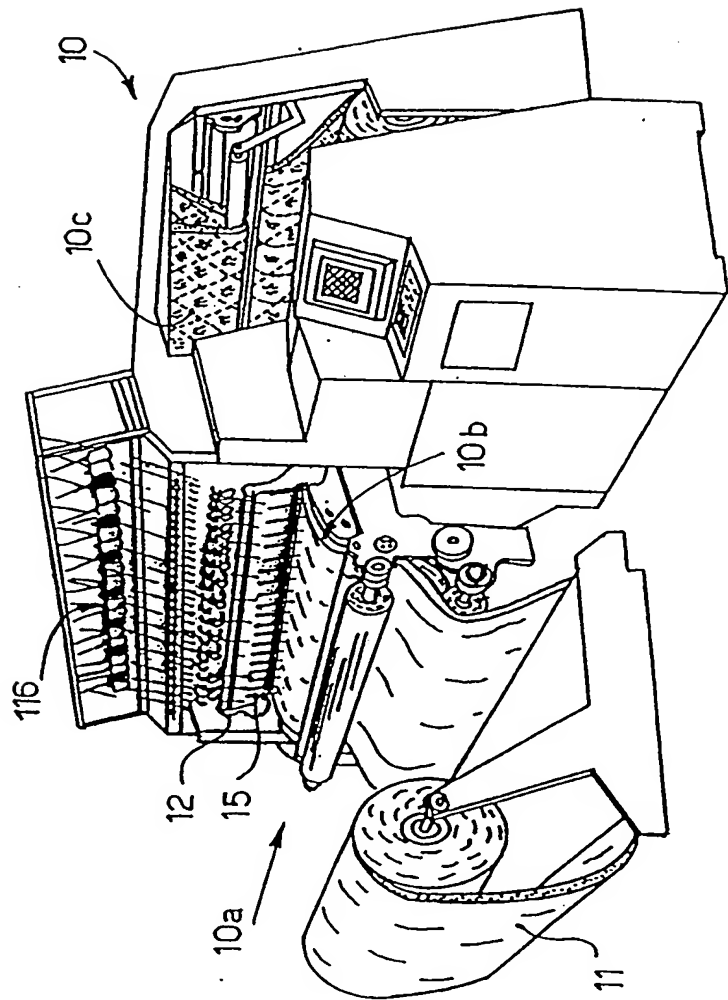


fig.1



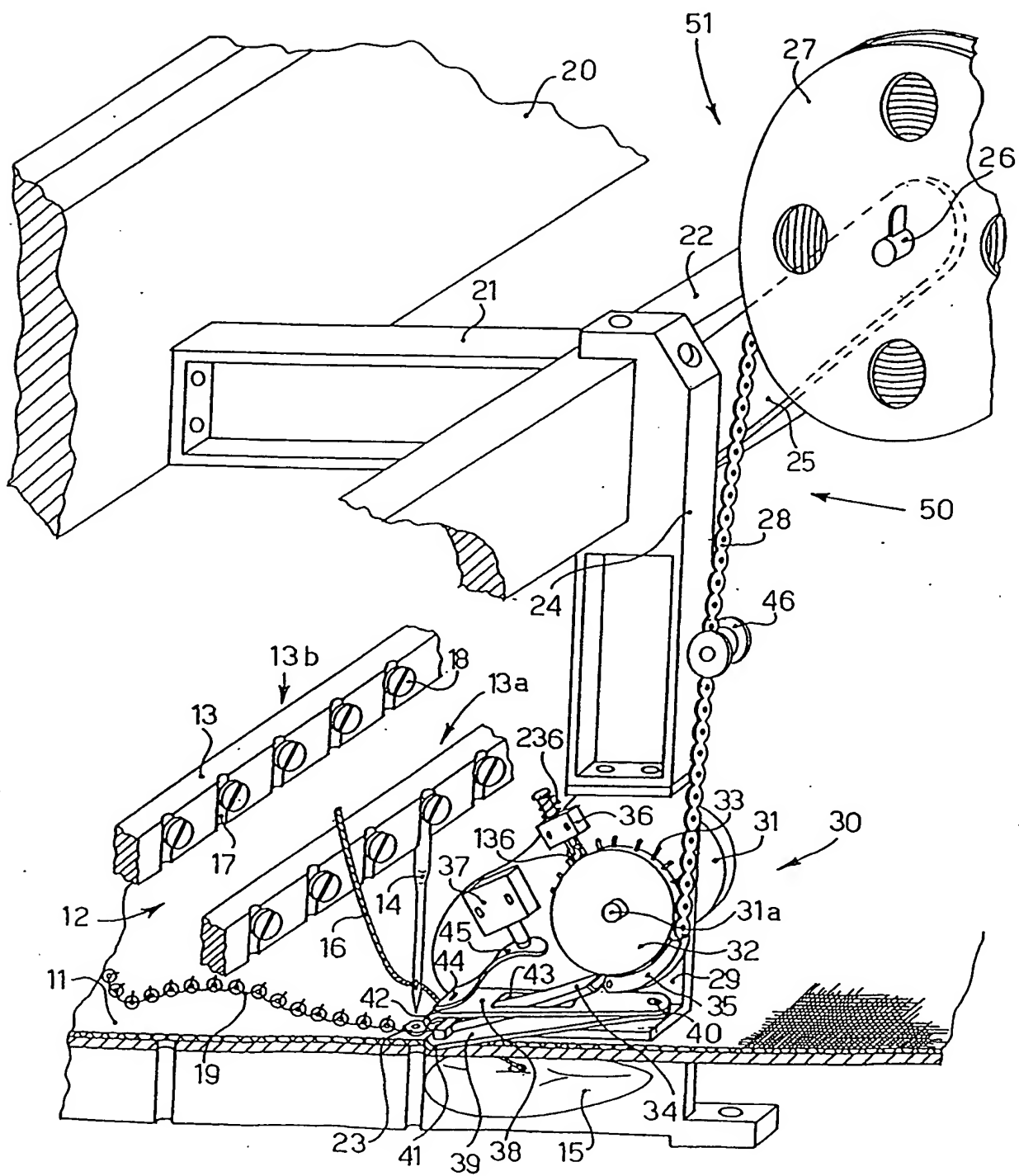


fig. 2

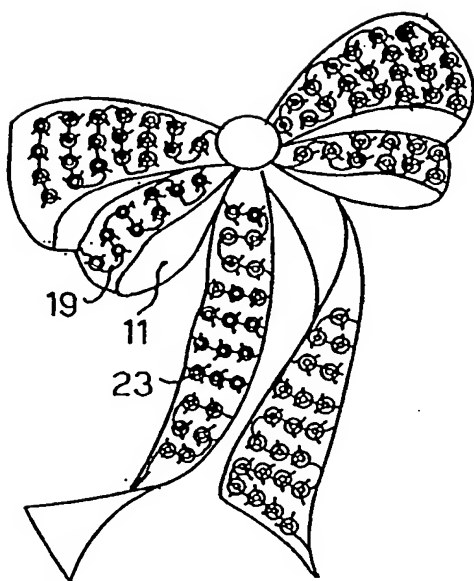


fig. 3a

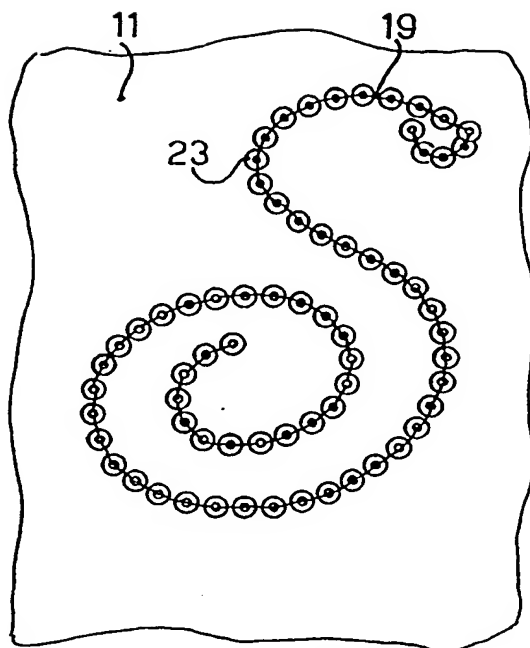


fig. 3b

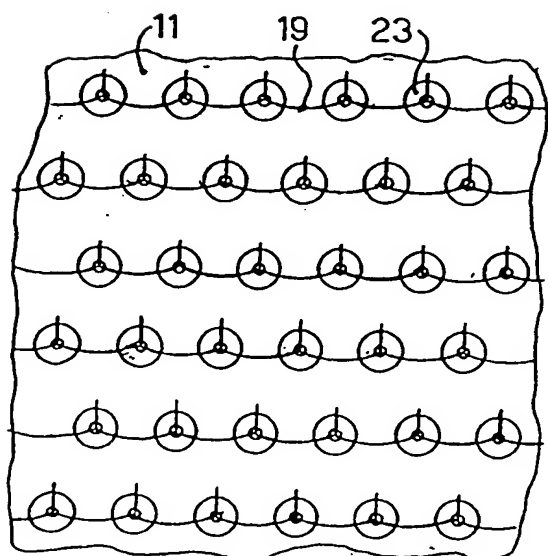


fig. 3c

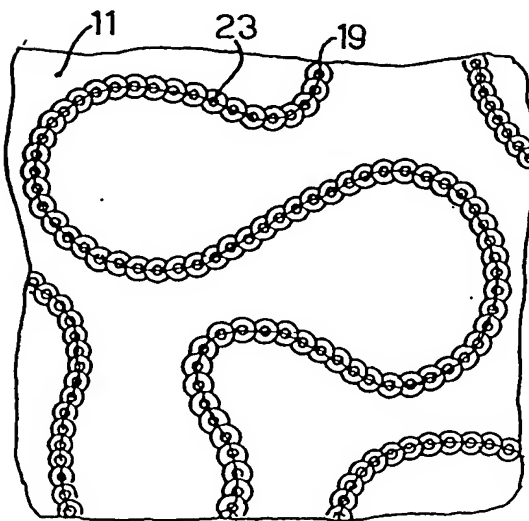


fig. 3d

## INTERNATIONAL SEARCH REPORT

In Application No  
PCT/IB 03/00236A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 D05C7/08 D05B11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 D05C D05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 848 253 A (TAJIMA IKUO) 18 July 1989 (1989-07-18) cited in the application the whole document	1-37
A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 143 (C-0703), 19 March 1990 (1990-03-19) -& JP 02 013495 A (TOKAI IND SEWING MACH CO LTD), 17 January 1990 (1990-01-17) abstract; figures	1-37
A	US 5 562 057 A (LENSON HARRY) 8 October 1996 (1996-10-08) the whole document	1-37

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- \*&\* document member of the same patent family

Date of the actual completion of the international search

27 March 2003

Date of mailing of the international search report

03/04/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Debard, M

## INTERNATIONAL SEARCH REPORT

Int application No  
PCT/IB 03/00236

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4848253	A	18-07-1989	JP 1052497 A	28-02-1989
			JP 1052498 A	28-02-1989
			DE 3806298 A1	02-03-1989
			GR 88100085 A ,B	25-05-1989
			IT 1219073 B	24-04-1990
JP 02013495	A	17-01-1990	NONE	
US 5562057	A	08-10-1996	NONE	